HEALTHY COASTAL ECOSYSTEMS FOCUS TEAM

OTHER GOAL 3 IMPACTS

OCTOBER 2009

118 ALASKA: Alaska Sea Grant helped protect coastal water quality

Activity Summary: In 2000, MAP began a partnership with the Alaska Native American Fish and Wildlife Society (ANAFWS), with funding from the Environmental Protection Agency (EPA), to conduct a water quality training program in rural Alaska. The goal of the program was to develop water quality monitoring projects that meet the strict scientific rigor of the EPA Quality Assurance Project Plan (QAPP) protocols. MAP developed the curriculum, taught 60 percent of the course content, served as a technical advisor on several QAPPs. ANAFWS funding of this training program ended in 2007. However, MAP began collaboration with the University of Alaska Anchorage's Environmental and Nature Resources Institute, and developed a recertification class. EPA has authorized this recertification program, which is now taught to technicians needing recertification. To date, three recertification workshops have been held, one each in Anchorage, Bethel, and Dillingham. Impact Statement: People participating in this training developed 18 EPA-approved Quality Assurance Project Plans for their region, and were thus able to receive funding to employ a local tribal environmental coordinator. Twenty-seven technicians have been recertified by MAP. These efforts established a first line of defense to detect future water quality issues. Participants are now actively engaged in questioning activities that may potentially affect water quality in their communities and regions, and are actively educating others in their communities about water quality issues. The data collected by these monitors provide a baseline for detecting and tracking future water quality changes that may result from human and natural change. *[(wq train)]*

221 ALASKA: Alaska Sea Grant identified disease as a possible factor in Steller's Eider, harlequin declines

Activity Summary: Multi-agency researchers characterized the occurrence and rate of disease and parasites among wintering sea ducks in Unalaska Bay. Threatened Steller's Eiders and harlequin ducks were the primary focus of the study. Researchers identified four viruses (adenovirus, reovirus, Newcastle disease virus, and influenza virus) and one fungal agent (Aspergillus spp.). An additional virus has been tentatively identified as a reovirus. Fourteen genera of bacteria were identified. Researchers also found other potential pathogens in 2007, including a Yersinia spp. in a Steller's eider, and evidence of intestinal helminths in both Steller's eiders and harlequin ducks. Impact Statement: The research enabled Alaska Sea Grant to play a vital role in helping to determine the probable cause of Steller's eiders and harlequin duck declines in Unalaska Bay. Results of this study will be used by the USFWS as it works with other state and federal agencies (DEC, EPA) to find solutions to the problems posed by disease in sea ducks. This project will be monitored to learn how it may affect policy and regulations aimed at addressing the disease problem. Project Level Impacts: Before this study began, exposure to disease was identified as a possible contributing factor to mortalities of Steller's eiders and harlequin ducks wintering near Dutch Harbor, Alaska. The findings of this project confirm that disease-causing organisms are present in sea ducks in Southwest Alaska. Scientists found that Steller's eiders and harlequin ducks in Unalaska Bay were more exposed to disease than were Steller's eiders and harlequin ducks in other wintering areas in Alaska. This finding suggests that such pathogens are being picked up within Unalaska Bay. Researchers believe an important source for E.coli may be untreated sewage or offal from fish processing outfall. Understanding the scale of disease occurrence will aid in understanding the effectiveness of future regulatory and policy actions by state and federal agencies. *[R/101-07 (unk end dis)]*

277 ALASKA: Alaska Sea Grant helped coastal communities control invasive rats

Activity: (Johnson and Education Services) Alaska Sea Grant joined with the Alaska "Stop Rats" coalition to help control rats in Alaska's coastal communities. The coalition is composed of the U.S. Fish and Wildlife Service, Alaska Department of Fish and Game, National Oceanic and Atmospheric Administration, Shipping Safety Partnership, and others. Alaska Sea Grant published the award-winning book, Rat Control for Alaska Waterfront Facilities, authored by Johnson. Impact Statement: The Alaska Sea Grant publication Rat Control for Alaska Waterfront Facilities has been adopted as the in-house training manual by American Pest Control, the largest pest control company in Alaska. Impact Statement: Education Services created a Web site that featured information provided by MAP agent Terry Johnson on rat control, and links to authoritative sites. Alaska Sea Grant published and distributed 480 copies of the award-winning book, Rat Control for Alaska Waterfront Facilities, authored by Johnson, around the state to harbormasters, fish plant operators, and other managers of waterfront facilities. *[(inv train wq)]*

322 ALASKA: Alaska Sea Grant improved the capacity of federal and state ornithologists to gather accurate data on Alaska coastal bird nests, eggs, and birds

Activity: (Education Services) A U.S. Fish and Wildlife Service ornithologist collaborated with Alaska Sea Grant to publish the first-ever Field Guide to Bird Nests and Eggs of Alaska's Coastal Tundra; the second edition was published in 2008. Impact Statement: The guide improved the accuracy of field surveys required in environmental impact assessments and other coastal development survey and planning work. The author reports that this book has become the standard reference for USFWS and other biologists who do bird nesting studies in Alaska, including government and university scientists, conservationists, and industry, including BP environmental staff and oil industry consultants. The book is the primary reference used in the annual USFWS Yukon Delta nest survey, which was the major impetus for creating the book. Alaska Sea Grant distributed 260 copies of the book to the U.S. Fish and Wildlife Service, Yukon Delta Fisheries Development Association, Delta-Greely School District, Valdez City Schools, Barnes & Noble Booksellers, Alaska Geographic Association, Alaska Department of Fish and Game, Natural History Book Service, Wrangell Museum, and others. *[C/A/161-01 (end unk)]*

270 CALIFORNIA: The Spread of Aquatic Invasive Species via Boat Hulls: Minimizing the Risk through Knowledge of Fouling Community Dynamics in Harbors

Boat owners, boating and coating businesses, agencies, policy makers, sanctuary and resource managers, academics and environmental organizations will soon need such research-based information to make cost effective decisions and create sustainable policies for controlling AIS among hull fouling organisms while protecting water quality. This is particularly true in California where the most popular fouling and AIS control technology -- use of copper-based antifouling paints – has impaired water quality, and some harbors are now facing regulatory action restricting the use of copper-based bottom paints. As a result, this information may help facilitate development of effective fouling control measures that are critically needed. Sanctuary and resource managers and the public at large will also benefit from the development of best management practices for boaters that minimize the spread of AIS. *[(inv wq wq)]*

278 CALIFORNIA: Copper pollution and costs to boaters reduced

New regulations require 2,000 San Diego Bay boat owners to cut 76% of copper discharges by 2022. Sea Grant collaborated on research that showed it would cost recreational boat owners in San Diego Bay $20 million to convert non-toxic hull paints over seven years, but only $1 million if the transition was stretched over 15 years. Instead of a short and expensive timetable, boat owners will have a two-year education period, followed by a 15-year conversion period as recommended by Sea Grant research, potentially saving boaters 95% in costs. *[(wq wq educ)]*

1132 CALIFORNIA: California Beach Health

This project has already had important impacts for habitat monitoring on sandy beaches and for the involvement of a variety of stakeholders in management practices. The California Grunion is now considered a Species of Special Concern and the sandy beach is considered Essential Fish Habitat according to the Magnussen-Stevens Act, as interpreted by the National Marine Fisheries Service and the California Department of Fish and Game. Citizen scientists from coastal California have been trained and have provided extensive data for an understudied species, and their commitment has extended beyond this one species to a sense of stewardship for the coastal habitat. The National Marine Fisheries Service- Southwest Region, Habitat Conservation Division has funded Grunion Greeter monitoring efforts in 2008 and plans to continue the work in future years. New management practices are in place throughout the habitat range of the grunion as a result of this work. The PI has evaluated habitat concerns for numerous agencies including California Coastal Commission, National Marine Fisheries Service, California Department of Fish and Game, Los Angeles Beaches and Harbors, California State Parks, the Goleta Beach restoration for the County of Santa Barbara, and ocean outlets in the County of Orange. The data were used in the assessment of the effects of the Cosco Busan fuel spill in San Francisco Bay. Numerous environmental organizations including Surfrider Foundation, Heal The Bay – Santa Monica, Santa Barbara Channel Keepers, and the Audubon Society are involved in grunion studies. Aquariums including Cabrillo Marine Aquarium, Birch Aquarium at Scripps Institution of Oceanography, the Roundhouse Aquarium in Manhattan Beach, the Aquarium of the Pacific in Long Beach, and the Ty Warner Sea Center of the Santa Barbara Museum of Natural History have grunion displays and programs as part of their mission. Several State Parks have initiated new public programs for grunion runs at their sites, including San Elijo State Beach, Bolsa Chica State Beach, Doheny State Beach, and Crystal Cove State Beach. Based on the efforts of the Working Group for beach managers and field operators, we are initiating the formation of a nonprofit organization. The focus will be to develop and disseminate best practices for beach management to balance wildlife conservation and recreation. *[R/CZ-195 (mon end train)]*

1195 CALIFORNIA: Sea Grant Investigates Bi-national, Socio-Economic Factors in Controlling Hull-Borne Invasive

Species and Reducing Antifouling Pollution Research results are anticipated to assist policy makers and boat owners in making sustainable decisions on policies and practices to co-manage invasive and other hull-fouling species and to reduce antifouling pollution, while maintaining California's $16 billion/year boating industry that supports thousands of small businesses employing diverse staff. For example our

data will help to identify affordability and geographic availability of supplies and services to prevent transport of invasive species among highly trafficked, boating areas of the California and Baja California coasts. *[A/EA-1 (inv wq)]*

1196 CALIFORNIA: Sea Grant Studies Ecology of Hull-Borne Invasive Species with Respect to Antifouling Practices and Pesticide Resistance

Research results are anticipated to assist policy makers and boat owners in making sustainable decisions on policies and practices to co-manage invasive and other hull-fouling species and to reduce antifouling pollution, while maintaining California's $16 billion/year boating industry that supports thousands of small businesses employing diverse staff. For example our data will help to identify when and how often hull cleaning is required to minimize the spread of invasive species. Actions that improve water quality, while minimizing the spread and impacts of aquatic invasive species, will ultimately benefit the health of ecosystems, including sensitive island habitats of California. *[A/EA-1 (inv wq)]*

1197 CALIFORNIA: Sea Grant Teaches Sustainable, Co-Management of Antifouling Pollution and Hull-Borne Invasive Species

Title: Sea Grant Teaches Sustainable, Co-Management of Antifouling Pollution and Hull-Borne Invasive Species Published technical report, Alternative Antifouling Strategies Sampler, disseminated 12 PSAs to 416 radio stations, and disseminated a total of 3507 diverse publications to U.S. and international audiences by mail, Internet site downloads, and meetings. 534 stakeholders and policy makers attended 15 public presentations. 2 radio interviews reached a total of 400,000 listeners. Sea Grant's information was included in 3 articles for 45,000 readers of SEA Magazine, 40,000 readers of The Log boating newspaper, and 1,100 readers of NOAA's "Information Exchange for Marine Educators" e-newsletter. 5305 Internet site viewers included 4335 U.S. and 970 international. Meeting and publication evaluations found that 71%-79% of respondents increased their capacity and 31%-34% stated intentions to use Sea Grant recommendations within 2 years for reducing antifouling pollution and for preventing transport of invasive species on boats kept in saltwater. *[A/EA-1 (edu wq inv)]*

223 CONNECTICUT: Connecticut Sea Grant helps assess the health of stranded marine mammals

Stranded marine mammals are regularly found on beaches and rehabilitated in specialized institutions. Health assessment of those stranded animals poses significant challenges but is key to appropriate treatment and medical care, leading to rehabilitation and release of those animals back in their environment. Health assessment can also be useful in situations requiring triage of cases to identify the best candidates for rehabilitation. Unfortunately, relatively few tools are available to precisely and accurately assess the health of stranded marine mammals. Impact: '¢ CTSG research is validating the use of immune function testing to help assess the health of stranded marine mammals during the course of rehabilitation. Results to date have contributed to the establishment of 'normal'⍰ ranges for the different immune parameters studied in different species of seals. Different species of seals also exhibit different patterns of immune alterations associated with changes in white blood cell counts. Our data also demonstrate that individuals suffering from significant decreases in more than one immune

function have the poorest chances of surviving and being successfully rehabilitated. '¢ Overall, CTSG efforts are contributing a new tool for health assessment of stranded marine mammals that may be useful in the medical management during the rehabilitation process. *[M/PA-1 (dis)]*

1231 CONNECTICUT: Sea Grant uses remote sensing technology and LiDAR data to inform invasive species eradication efforts

Methods and maps of Phragmites australis, derived from satellite remote sensing and LiDAR data, are being used by the Connecticut DEP and the Connecticut Chapter of The Nature Conservancy to develop and direct their Phragmites eradication efforts in brackish tidal marshes of the lower Connecticut River. *[A/ (inv mod)]*

116 DELAWARE: DESG Study Deploys New Micro-Electrode for Use in Long-Term Observing Systems

Researchers have developed new types of microelectrodes for biogeochemical measurements made at coastal observing systems. Data from the new electrodes can be transmitted from a mooring in Delaware Bay to a shore-based laboratory via radio telecommunication. Results from the mooring showed that dissolved oxygen concentrations in lower Delaware Bay are above saturation throughout the year. Impact: Suitability of the new electrodes fixed moorings has been clearly demonstrated. The Delaware Bay Observing System has been enhanced. *[R/ECO-4 (mon)]*

219 DELAWARE: DESG Researchers Develop Molecular Monitoring Tools for Oyster Stock Enhancement Efforts

DESG Researchers Develop Molecular Monitoring Tools for Marine Water Quality Testing. Developed and optimized molecular testing protocols for pathogen and fecal indicator bacteria. Worked in collaboration with the state's environmental monitoring agency (DE DNREC) and the SG Citizen's Monitoring Program to compare the new technique vs standard tests for total Enterococcus. The new techniques are more sensitive and more specific. Impact: This tool extends the capability of the Delaware's state monitoring agency for detecting the presence of harmful bacteria. It can be applied in waters beyond Delaware. *[R/BT-1 (mon wq wq)]*

1294 ILLINOIS/INDIANA: IISG engages the pet industry to prevent the spread of AIS

Release of aquatic pets by releasing individuals or by dumping whole aquaria frequently has been identified as a pathway by which invasive aquatic plants and animals have been introduced and/or spread. In the Great Lakes alone, there are at least 10 species that have become established that most likely were introduced via this pathway. Because of IISG actions, a nationwide information and education campaign called Habitattitude™ was developed in conjunction with the U.S. Fish and Wildlife Service and the Pet Industry Joint Advisory Council, and leading pet and aquarium dealers in both states have become partners in this campaign whereby vendors deliver science-based products and messages to their customers. As a result, 37 percent (202 of 550) of the pet stores in Illinois are helping spread the

HabitattitudeTM message by displaying information on the campaign in their stores. In addition, two dealers took the added step and signed on as partners in the HabitattitudeTM campaign. *[A/SE-05-06 (edu inv)]*

1305 ILLINOIS/INDIANA: Sea Grant expands training and support for unwanted medicine collection programs

Prescription drugs often end up in wastewater treatment plants and can then contaminate waterways. IISG has developed a resource kit and held workshops to help communities starting unwanted medicine take-back programs. As a result of an IISG workshop and the program's resources, in Sangamon County, Illinois, approximately seven 55-gallon drums of household medicines were collected for safe incineration. Kendall County began an ongoing collection program--residents can drop off medicines at the police station any time. IISG is also co-sponsoring a two-county pilot mail back program with the Wisconsin Pharmaceutical Waste Working Group, a coalition of state and local officials, university extension, several companies involved in disposal, Milwaukee sewage specialists and others. This program, which will launch in 2008, is the first-of-its-kind-- individuals can call to request a mail back envelope to send in their unwanted medicines. IISG provided funding that has been used for graphic design, printing, student help, and other supplies that will be used to distribute information about this mail-back program. IISG has played key roles in the planning and ground work of this new program. *[A/ (train wq)]*

1308 ILLINOIS/INDIANA: Sea Grant informs Chicago AIS ordinance

To help prevent the spread of aquatic invasive species (AIS) that lead to serious economic and ecological harm, IISG has supported research, informed managers and policy makers, raised awareness, and changed public behavior. In 2007, the City of Chicago passed an invasive species ordinance, which was informed by Illinois-Indiana Sea Grant AIS specialists and IISG-funded research results. The new ordinance now makes it unlawful to "import, sell, transport, carry, own, keep or otherwise possess" and "release" (for animals) and "introduce into the environment" (for plants) any of the regulated species. The initial list is focused on 26 critical species that are threatening the region, including bighead carp, snakehead, and European watermilfoil. *[A/SE-05-06 (inv)]*

215 LAKE CHAMPLAIN: Sea Grant training increases law enforcement expertise relative to aquatic invasive species (AIS).

Statement: During the spring and summer of 2007, fifty three law enforcement officers (including VT State Police, NYSDEC Conservation Officers, and NYSDEC Forest Rangers) received training to assist them with various transport and possession regulations related to invasive species, during several workshops hosted jointly by VT/NY state agencies, Lake Champlain Basin Program and Lake Champlain Sea Grant. Impact: Ninety seven percent of the law enforcement personnel reported an increase in AIS identification skills as a direct result of training conducted by LCSG Specialist M. Malchoff. Ninety six percent of the VT State Police and 73% of the NYS DEC Conservation Officers indicated a 50% to 75% likelihood that they would implement this knowledge in the next 6-12 months. *[(train inv)]*

252 LAKE CHAMPLAIN: Sea Grant and USFWS workshop on invasive species recognition pays off years later

Focus Area: HEALTHY COASTAL ECOSYSTEMS NOAA SG Goal-Restored function and productivity of degraded ecosystems LCSG Goal - Restore coastal and aquatic ecosystems in the Lake Champlain basin. Objective - Prevent the introduction of new aquatic invasive (non-indigenous and nuisance) species (AIS) into Lake Champlain or the basin, slow the spread of existing AIS and mitigate their impact in basin waters. Sea Grant and USFWS workshop on invasive species recognition pays off years later. Early in 2003, LCSG, USFWS and USGS staff presented an aquatic invasive species workshop for law enforcement personnel charged with invasive species interdiction on the U.S. - Canadian border in the vicinity of Lake Champlain. The training paid off in August 2008, when a Canadian citizen declared her intent to transport a shipment of live fish into the U.S., including several Emperor snakehead (Channa marulioides). The entire shipment was seized. LCSG and local USFWS staff confirmed for USFWS law enforcement staff that the seized fish were in fact one of several species of snakehead listed as 'injurious,' under the provisions of the Lacey Act. Listed species may not be imported into the United States without a USFWS permit, who are reviewing the case for possible prosecution. *[A/M-1 (inv train)]*

272 LAKE CHAMPLAIN: Sea Grant invasive aquatic species (ANS) education and research efforts help slow invasive species arrival in the basin

Statement: LCSG ANS education and outreach efforts are the longest continuous education effort in the basin. Working with other agencies, we have increased awareness and initiated management measures to stop the spread of invasive aquatic species into the basin. Impact: The June 2008 State of the Lake summary reported no new invasive species have reached the lake since 2004. *[(inv educ)]*

273 LAKE CHAMPLAIN: Sea Grant report lays the foundation for aquatic invasive species (AIS) dispersal barrier feasibility study for the Champlain Canal

Statement: In 2005, LCSG staff, Univ. of Vermont faculty, and VTDEC staff working as project investigators completed a study of the canal as a likely vector of invasive species. The group also provided a brief analysis of potential AIS species barrier technologies which could serve to stem future invasions. In 2007 staff of Sen. Leahy and Rep. Welch asked LCSG staff for a review and analysis of the findings, a review and update of other barrier projects, and an update on AIS in Lake Champlain and Impact: In November 2007 Congress authorized (as part of the Water Resources Development Act, SEC.5146), the United States Army Corp of Engineers to determine, "at full Federal expense, the feasibility of a dispersal barrier project at the Lake Champlain Canal. If the Secretary determines that the project described…..is feasible, the Secretary shall construct, maintain, and operate a dispersal barrier at the Lake Champlain Canal at full Federal expense." The legislation cites a "2005 Sea Grant study [which] documented the introduction of at least 18 species into Lake Champlain via the canal system that is a direct pathway for the entry of invasives from both the Hudson River and Lake Ontario-Great Lakes systems." *[A/M-1 (inv)]*

495 LAKE CHAMPLAIN: Sea Grant helps businesses reduce phosphorous in stormwater runoff

Statement: Commercial landscapes account for significant proportions of total lawn area in impaired urban/suburban watersheds in the Lake Champlain Basin. Often ignored in NPS pollution reduction efforts, LCSG continues to works with managers of business and institutional properties to promote the adoption of low input/no phosphorous grounds care through one on one educational activities and technical support. Impacts: An August 2007 survey showed property managers participating in the Burlington pilot project (responsible for an estimated reduction in annual phosphorous loads in runoff of between .45 and .91 metric tons/yr.) were continuing low in put practices after 3 years. Training and assistance provided to property managers lowered barriers to adopting or maintaining BMP for sustainable grounds care on over 128 acres (65%) of priority commercial/institutional lawn area in the Stevens and Rugg Brook watersheds in St Albans, VT. Reduced stormwater runoff volume, and reduced erosion and sediment transport were evident after the first season. Monitoring of runoff volumes, suspended sediment and phosphorous will quantify the impacts. *[(mon train wq)]*

566 LAKE CHAMPLAIN: Sea Grant rain garden education and demonstration projects improve water quality in VT urban areas

LCSG's Winooski Rain Garden Project trained city staff and led the city to adopt rain gardens and rain barrels on municipal property throughout the small (1 mi²) , heavily urban former mill town. Impact: Measurements made at stormwater outlets after various levels of rainfall showed a significant reduction in stormwater volume discharging to Morehouse Brook, a stormwater impaired stream. Reductions in volume discharged ranged from over 70% in ½ inch rainfall to nearly 30 % in a 3 inch rainfall. *[A/M-1 (wq train)]*

1076 LOUISIANA: Nab the Aquatic Invader!

Teachers and students became aware of the problems aquatic invasive species pose on the environment and the economy and what they can about it. Teachers also reported that their students interacted with 780 people and exposed them to AIS information through presentations and showcasing their projects thus bringing a better understanding of AIS to themselves, their schools and their communities. *[E/ANS-03 (inv train)]*

227 MAINE: York takes action to protect water quality

The town of York's sandy beaches are an integral part of the local economy, yet several beaches periodically experience high bacteria levels, forcing swim advisories. Town officials, working with the Maine Healthy Beaches program, created a new position for a Shoreland Resource Officer. This new position has allowed the town to be proactive by expanding its water quality program beyond the shoreline to include the upstream watersheds. In addition, with help from the U.S. EPA, beach monitors collected and analyzed additional water samples to identify the source of pollution in the Cape Neddick River. When these results were presented to the town by the beach manager and the Shoreland

Resource Officer, the York Selectmen unanimously voted to track down and remediate land-based sources of pollution. *[A/08-01 (wq wq mon ebm)]*

274 MARYLAND: Interactive template for invasive species rapid response plans available for states

Developed a comprehensive invasive species rapid response plan template for use by states in the Mid-Atlantic region and beyond for responding to newly introduced invasive species. Included sighting reports, comprehensive flow chart and step-by-step process using the Incident Command System design for agencies to follow when responding to a report of an invasive species. Template has been modified for use and adopted by Maryland, Virginia and Delaware's state agencies. It has also been requested by Florida and Arkansas. All forms are available on numerous web sites including MDSG. *[M/M-1 (inv)]*

30 MICHIGAN: Goby Research Helps Explain Rapid Spread

Research supported in part by Michigan Sea Grant has revealed how the invasive round goby may have spread so rapidly throughout the Great Lakes. Round gobies were first discovered in the St. Clair River in 1990. While ballast water was the most likely source, scientists questioned how the bottom-dwelling goby became mixed with water normally taken for ballast higher in the water column. Following sampling trips in 2003, 2004 and 2005, investigators documented a vertical migration of round goby larvae from the bottom to surface waters at night during the summer breeding season. Findings published in 2007 suggest that the nightly movement from the lake bottom to the surface may increase the chances that larval round gobies are drawn into ballast water and transported to and within the Great Lakes. Project results have important implications for ballast-water management on freighters that visit Great Lakes ports *[(inv)]*

119 MICHIGAN: Sea Grant Helps Baitfish Industry Cope with Deadly Fish Virus

In partnership with the Michigan Baitfish Association, Sea Grant developed model AIS-HACCP and biosecurity plans tailored to baitfish operations to prevent the spread of aquatic invasive species, notably Viral Hemorrhagic Septicemia (VHS). Since 2005, VHS has caused fish kills in the Michigan waters of northern Lake Huron, Lake St. Clair and the St. Clair River, and Lake Erie. Through Sea Grant workshops, 60 Michigan baitfish wholesalers and retailers were trained in AIS-HACCP procedures, allowing them to become certified as disease-free facilities by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service, and to remain in operation. Certified VHS-free minnows are now widely available in Michigan bait shops. Further broadening program impact, Michigan Sea Grant presented the model AIS-HACCP and biosecurity plans to HACCP trainers in Wisconsin, Minnesota and South Dakota. *[(inv fish dis train)]*

269 MICHIGAN: Sea Grant Outreach Contributes to AIS Policy Development

Staff members from Michigan's departments of agriculture, environmental quality and natural resources requested Michigan Sea Grant's assistance in developing a protocol to use in recommending additions

and deletions from the state's new legislatively adopted lists of prohibited and restricted species. Sea Grant's stakeholder workshop discussions provided guidance for developing the listing and de-listing protocol and provided a basis for work on updating the state's Aquatic Invasive Species (AIS) management plan. *[(train inv)]*

275 MICHIGAN: Education Campaign Encourages MI to Address Invasive Species

Michigan Sea Grant staff recognized the threat posed by invasive species early on and began tracking the occurrence and spread of aquatic invasive species in the mid 1980's. Soon after the discovery of zebra mussels in Michigan waters, Michigan Sea Grant hosted workshops and conferences designed to assist specific industries, such as utilities, to adapt to change resulting from the invasions. Sea Grant helped develop and standardize best practices for how specific industries can efficiently deal with invasions and how citizens can prevent the spread of invasive species. Sea Grant has created a wide range of educational factsheets, posters, brochures and curriculum, many of which are now being distributed by our state and local partners. As a result of Michigan Sea Grant's education efforts, both in Michigan and through participation in regional activities, local, state and federal government entities in the region are now funding and implementing invasive species tracking programs and developing their own education programs, often with Sea Grant content. *[(inv)]*

497 MICHIGAN: Clean, Green Marinas Reduce Water Pollution

MI Sea Grant is part of an industry, state government, university partnership that developed and implemented the Michigan Clean Marina program. Sea Grant staff developed the program website, conducted certification workshops, and collaborated on training materials including development of a suite of best practices to help marinas reduce their environmental footprint. To date, 65 marina facilities are voluntarily participating in the Michigan Clean Marina Program. Of these marinas, 21 facilities have achieved Clean Marina certification with an additional 44 pledging to become a certified Clean Marina. *[(wq)]*

498 MICHIGAN: Recycling Plastic, Supporting Michigan Businesses

Marinas, recycling businesses and solid waste facilities are now collaborating to divert thousands of pounds of recyclable plastic shrink-wrap from area landfills, as a result of Sea Grant outreach leaders and partners actively promoting the program. Shrink-wrap, a recyclable plastic material, is used by manufacturers to make recycled plastic products. MI Sea Grant developed the outreach materials and templates for others to customize for educational efforts in Michigan communities, leveraging work from a pilot program in 2007. *[(wq)]*

499 MICHIGAN: Michigan Clean Marinas Reduce Water Pollution, Recycle Shrink-wrap

The Michigan Clean Marina program, a collaborative program led by Michigan Sea Grant, Michigan Department of Natural Resources, and Michigan Boating Industries Association since 2002, encourages

marinas to reduce non-point source pollution by voluntarily adopting best management practices. Sea Grant assisted in conducting clean marina workshops, sharing program materials with neighboring states, and implementing a pilot boat shrink-wrap recycling program. In 2007, this unique partnership involving business, government and academia, also established a foundation to secure continued funding for this successful program. Seventeen Michigan marinas around the state have achieved clean marina status, reducing overall environmental impact on the Great Lakes and connecting waterways. In addition, marinas in southeast Michigan piloted a plastic shrink-wrap recycling program, diverting an estimated 150,000 pounds of reusable plastic from area landfills. *[(wq)]*

1365 MICHIGAN: Marinas help divert shrink-wrap from landfills

A pilot shrink-wrap recycling program in Southeast Michigan resulted in the diversion of approximately 150,000 pounds of boat shrink-wrap from landfills to be used for recycled plastic products. *[C/A/C-1 (wq)]*

1366 MICHIGAN: Michigan Clean Marinas' Plastic Shrink Wrap Is Being Recycled Instead of Landfilled

Several of southeastern Michigan's Clean Marinas are using Best Management Practices and helping improve the quality of the state's waterways by recycling 150,000 pounds of plastic shrink wrap waste instead of sending it to landfills. *[A/FP-1 (wq)]*

1367 MICHIGAN: Sea Grant's Aquatic Invasive Species Expertise Benefits Outreach Programs and Policy Development

State of Michigan agencies, Great Lakes regional commissions, federal agencies, organizations and institutions recognize and value Sea Grant's research based contributions on aquatic invasive species (AIS) issues and seek Michigan Sea Grant's counsel and collaboration on significant efforts. In 2006-07, the Department of Environmental Quality asked Michigan Sea Grant to develop materials, conduct training and provide support for a boater education program called Clean Boats, Clean Waters (CBCW). During the two year pilot program, Michigan's CBCW volunteers made more than 2,000 personal launch site contacts with boaters, almost all of whom responded favorably to the message. In 2006-2007, staff members of Michigan's departments of agriculture, environmental quality and natural resources requested Sea Grant's assistance with developing a protocol to use in recommending additions to/deletions from the state's new legislatively adopted lists of prohibited and restricted species. Sea Grant's stakeholder workshop discussions provided guidance for developing the protocol and provided a basis for work on updating the state's AIS management plan. *[A/FP-1 (train edu inv)]*

124 MINNESOTA: Sea Grant Redefines How E. coli Bacteria is Used in Water Quality Monitoring

Sea Grant scientists discovered that E. coli, which is used to justify beach closures and impaired stream designations, doesn't always come from potentially harmful sources. E. coli can be carried by benthic fish and can reside in sand, sediment, soils, and algae. The discovery nullifies assumptions that E. coli is washed into the water from the land or comes from sewage overflows. Sea Grant researchers also

developed new protocols (rep-PCR DNA fingerprinting) for rapidly testing for bacteria and identified sources for most E. coli bacteria in samples from northeastern Minnesota. Samples from gulls, terns, deer, and beaver contributed to a total of 234 new isolates in the region's E. coli fingerprint library. Humans contributed between 0 and 9 percent of the total E. coli that could be identified in each sample. By contrast, E. coli from waterfowl and wildlife accounted for 56-97 percent. Results are being used by the Minnesota Pollution Control Agency (MPCA) to refine testing methods and health risk assessments. Citizens tested bacteria monitoring kits and found that the Petrifilm test kit works best for E. coli monitoring. Volunteers collected nearly 600 bacteria samples from 86 different sites on 40 streams and 14 lakes in 23 Minnesota counties. The sites they monitored were established in the EPA STORET database and data from the 4-year project was submitted to the Minnesota Pollution Control Agency for use in lake and stream assessments. Data are often used by local governments or citizen groups for targeting additional monitoring, identifying areas for best management practices, or securing and allocating funds to conduct further monitoring. Several streams were listed as impaired on the MPCA impaired waters list as a result of volunteers' monitoring. *[(wq wq)]*

253 MINNESOTA: Sea Grant Aquatic Invasive Species Prevention Training Helps Businesses, Changes Federal and State Policies

The Aquatic Invasive Species-Hazard Analysis and Critical Control Point program (AIS-HACCP), a Great Lakes Sea Grant Network Program led by Minnesota Sea Grant to prevent the spread of AIS by the aquaculture and baitfish industries, led to an estimated 1,035 plans put in place by businesses and agencies. These plans, similar to the HACCP system used by the seafood industry to minimize seafood consumption health risks, address points in the fish and bait handling business that are critical for AIS contamination or release. Over 540 private, state, and federal fish producers from at least 16 states and the Province of Ontario are trained to used AIS-HACCP methods. About 20% conducted their own workshops, training an additional 2,260 people. Workshop participant evaluations show that 90% think AIS-HACCP training is effective. Over 60% became aware of new risks they posed for spreading AIS, which indicates the project had a significant impact on participants' knowledge and awareness. AIS-HACCP training led the Minnesota Department of Natural Resources (DNR) to change regulations for harvesting baitfish in designated infested waters of two important harvest areas: Mille Lacs Lake and the Rainy River. The DNR allowed bait harvesters and their helpers to harvest out of Mille Lacs Lake (which had become infested with Eurasian watermilfoil) if they were trained in the AIS-HACCP process. Later, when zebra mussels were found in the lake, an AIS-HACCP-like approached allowed for harvest when risks were acceptable. When the Rainy River was infested with spiny waterfleas, the DNR allowed for baitfish harvest after harvesters attended AIS-HACCP training. Other important impacts: '¢ The U.S. Fish and Wildlife Service Sea Lamprey Control Program developed a AIS-HACCP team to address disease issues related to the transfer of sea lampreys around the Great Lakes for sterile male releases. '¢ The Indiana DNR developed a plan for their fish management and research fisheries survey activities. '¢ The Illinois Environmental Protection Agency developed and implemented AIS-HACCP plans. '¢ By 2010, all 2,000 bait producers in Ontario, Canada, will be required to have training and have a plan in place. '¢ Participants from South Africa intend to conduct training workshops in their country. *[A/P-1 (inv train dis)]*

276 MINNESOTA: Sea Grant Prevents the Spread of Non-Native Species Through National Campaigns

President Bush's response to the Commission's Report, An Ocean Blueprint for the 21st Century, cited Minnesota Sea Grant as an example of how government works with academia and with businesses to solve problems. The citation referenced the NOAA Sea Grant Habittatitude Campaign led by Minnesota Sea Grant in partnership with the pet industry and the U.S. Fish and Wildlife Service. The goal of the campaign is change people's behavior to prevent the release of non-native plants and animals. The campaign promotes the message: do not release fish and aquatic plants; and offers alternative actions that people can take. At pet stores and garden centers, Habitattitude messages are on bags, new tanks, and in-store displays. The campaign also reaches consumers through pet magazines, newspaper circulars, the Web, and presentations and displays at events. The pet industry has contributed over $1 million. More than 90 partners have joined the effort. Over 90% of survey respondents viewed the Habitattitude logo and messages favorably. Even though some respondents reported they had released unwanted organisms into the environment, 84% said the campaign information would keep them from releasing unwanted pets into the environment in the future. The aquarium industry, federal and state agencies, and half of the Sea Grant programs nationally support the campaign. The campaign strengthens business partnerships. The campaign expanded into Canada, and Mexico and New Zealand have expressed interest in adopting it. ---------- Evaluation showed that 97 percent of boaters and anglers in Minnesota, Wisconsin, and Iowa took action at water accesses to prevent the spread of aquatic invasive species in part due to The Stop Aquatic Hitchhikers! campaign, which conveys simple, consistent guidelines to boaters and anglers that empower them to take action to prevent the spread of aquatic invasive species by inspecting and cleaning their equipment. Campaign surveys show that in states that dedicate resources to the campaign and use more communication outlets, boaters and anglers were more aware of AIS and more likely to take future action at water accesses to clean and check their equipment than boaters in other states. After the campaign became more visible in Wisconsin and Iowa, surveys showed that 20% more boaters and anglers in those states were influenced to take action at water accesses. These results strongly suggest that the campaign influences its audience. Over 60 partners have signed onto the campaign. By leveraging resources with Wildlife Forever to maximize impacts, the campaign reached over 1,000 people for every $1 spent. Funding leveraged was 2.7:1. The implementation cost savings for partners is considerable and demonstrates how the campaign can maximize impact, with possible savings of million of dollars annually. *[(inv)]*

321 MISSISSIPPI/ALABAMA: Legal Research on Proposed Hawaiian Bounty Program

The Hawaii Department of Business, Economic Development, and Tourism sought information about the contract and liability issues surrounding the development of a reward program for recovery of derelict fishing gear. The Law Center concluded that the liability concerns were misplaced as the state should be immune from most suits and the reward program would not result in contractual relationships. According to the requesting individual, our research 'helped dispel what seemed to have been '˜an urban myth.' This myth was a roadblock to implementing a major marine debris retrieval program.'? The agency expects to receive funding in 2008 to finally implement the reward program. *[A/L-4 (wq leg)]*

1386 MISSISSIPPI/ALABAMA: Sea Grant researchers assess estuarine populations to provide managers with decision making information.

Knowledge of status and trends in abundance of commercially exploited species is a key component of management. Management agencies usually operate with limited state funding to collect, analyze, and interpret data. The current project provided the opportunity to use advanced statistical techniques to analyze archived fisheries data for the states of Mississippi and Alabama. This work is a starting point toward understanding the incremental impacts of human population growth and industrial development on fisheries productivity and the development of strategic plans for mitigation of causative factors. Impact: The Mississippi Department of Marine Resources (MDMR), the Alabama Department of Conservation and Natural Resources, Marine Resources Division, the Mobile Bay National Estuary Program and the Gulf State Marine Fisheries Commission Blue Crab Subcommittee and Technical Coordinating committee has reviewed and interpreted this data. Managers can use this model to discern causes for declining population trends. Based on the findings of this study, the MDMR formed a committee to update sampling protocols and initiated a comprehensive program to address monitoring issues and other state agency managers have the tools needed to make informed decisions and take the necessary action to better manage a changing habitat. *[R/SP-16 (ebm mod mon)]*

228 NEW HAMPSHIRE: Sea Grant draws attention to a major source of PAHs in the environment

Sea Grant-supported researchers at the University of New Hampshire have proven that fresh pavement sealcoat, particularly coal-tar based sealcoat, contributes significant amounts of polyaromatic hydrocarbons into waterways via stormwater runoff. Impact: Both the EPA and the sealcoat industry are using these findings in an effort to mitigate the problem. *[R/CE-138 (wq wq wq)]*

1395 NEW HAMPSHIRE: Sea Grant takes a holistic approach to reducing marine debris

UNH teamed with the Blue Ocean Society in an effort to remove derelict commercial fishing gear from the Gulf of Maine. Funded by NOAA, the Marine Debris to Energy program produces energy via a waste-to-energy plant. Debris sources and distribution patterns in the Gulf are recorded using underwater sonar. Fishermen, beach cleanup crews and the general public report the location, including latitude, longitude and water depth, where they found the debris. Once the information is entered into a database, it is available on GIS maps for online access at www.nhmarinedebris.org. Impact: NHSG has helped create a model program that could easily be replicated in other regions. *[A/P-42 (wq)]*

229 NEW JERSEY: NJ Sea Grant efforts in NJ Clean Vessel Act Program reduces sewage discharge

The impacts of sewage discharge from recreational and commercial vessels contribute to the degradation of coastal water quality, especially in areas with reduced tidal flushing capacity and high concentration of boats. Since 1995, The New Jersey Clean Vessel Act Program has provided marina owners in New Jersey with an opportunity to apply for funds to install vessel pump-outs at their facilities that collect and dispose of vessel-generated sewage. With management by the New Jersey Sea Grant Extension Program there are now 177 pump-outs and five (5) pump-out vessels that serve boaters that reside in and transit through the state as compared to 50 pumpout facilities in 1995. Over the past

several years approximately 600,000 gallons of sewage were collected annually at marina and pumpout boat facilities. *[A/SGEP-1 - A/S-1 (wq wq wq)]*

230 NEW JERSEY: NJ Sea Grant Improves Recycling in the Recreational Boating Industry

Hundreds of tons of shrink wrap are used every year in New Jersey to protect boats during the harsh winter season. To reduce the amount of shrink wrap that ends up in landfills, the New Jersey Sea Grant Extension Program and the New Jersey Department of Environmental Protection (NJDEP) Coastal Management Office partnered to increase the number of shrink wrap recycling locations, and to launch an education and outreach effort to promote recycling shrink wrap and other materials used to store and maintain boats. The number of disposal options/locations has increased by 20 for a total of 29. According to marine supply businesses, marinas and other boating businesses in New Jersey, approximately 450,000 pounds of shrink wrap is purchased annually and approximately 300,000 pounds or 66% was recycled was recycled in 2006 with an additional 7% increase to 330,000 pounds recycled in 2007. As a result of the education and outreach effort approximately three recycling businesses have been able to expand their client base. *[A/SGEP-1 - A/S-1 (wq train)]*

231 NEW JERSEY: Sea Grant Helps Prevent Sewage Discharges (2008)

(2008) The New Jersey Sea Grant Extension Program has continued its partnership with federal, state and local agencies to reduce sewage discharges from recreational and commercial vessels. The federal Clean Vessel Act and New Jersey Fish and Wildlife have provided funding for 165 pump-outs facilities at marinas and five (5) pump-out vessels to meet the sewage disposal needs of boaters. During the 2008 boating season approximately 600,000 gallons of sewage were collected at marina and pumpout boat facilities. *[A/SGEP-1 - A/S-1 (wq wq wq)]*

232 NEW JERSEY: Sea Grant Develops Education to Improve Recycling in the Recreational Boating Industry (2008)

(2008) New Jersey Sea Grant Extension Program and the New Jersey Department of Environmental Protection (NJDEP) Coastal Management Office partnered to increase the number of shrink wrap recycling locations and, launch an education and outreach effort to promote recycling shrink wrap and other materials used to store and maintain boats. This initiative was made possible by a grant from the I BOAT NJ Program. As a direct result of this effort the number of shrink wrap disposal options has been increased from six to twenty nine and the amount recycled has increased from approximately 36% to 75% *[A/SGEP-1 - A/S-1 (wq train)]*

572 NEW JERSEY: NJ Sea Grant efforts in NJ Clean Marina Program promotes state legislation

The New Jersey Sea Grant Extension Program continued its partnership with the New Jersey Department of Environmental Protection Office of Coastal Management to conduct the New Jersey Clean Marina Program. The Clean Marina Program seeks to assist marinas in complying with regulations by

implementation of best management practices. Thirteen (13) marinas are recognized as â€œClean Marinasâ€ with approximately 25 more marinas in the process. Recent proposed legislation by the New Jersey Senate (S2881) provides credit under corporation business tax and gross income tax for marinas and boatyards that follow certain environmentally sound management practices. *[A/SGEP-1 - A/S-1 (wq)]*

573 NEW JERSEY: Sea Grant Helps Marinas Meet Requirements of the Clean Marina Program (2008)

(2008) The New Jersey Sea Grant Extension Program continued its partnership with the New Jersey Department of Environmental Protection Office of Coastal Management to implement the New Jersey Clean Marina Program to minimize the impact recreational boating activities have on the environment. Over 120 marinas have participated in Clean Marina related workshop, 200 marinas have received the guidebook and 27 marinas have been recognized as a Clean Marina. Marinas have implemented best management practices to reduce spills that occur during fueling, capture water from hull washing, rent dustless sanders, improve recycling efforts, collect mercury containing devices, develop emergency response plans, educate boaters and installed pumpout facilities. *[A/SGEP-1 - A/S-1 (wq)]*

123 NEW YORK: New Approaches for Assessing Mutagenic Risk of Contaminants in the Long Island Sound Environment

R/CTP-30 Sea Grant researchers have adapted a cutting-edge biomedical technique to test for the mutagenic potential of coastal sediments. The benthic sediments in urban habitats represent a reservoir of persistent contaminants that may pose a threat to both ecosystem and human health. To help evaluate these risks, testing approaches are needed that assess both acute mortality and potential chronic effects that may reduce the fitness of affected populations. Using a strain of fish embryos carrying a specific gene developed for biomedical research (the Japanese medaka, Oryzias latipes, carrying a lambda cII transgene), researchers tested for the mutagenicity of a large number of sediment samples collected around metro New York and Long Island Sound (LIS). This was a novel use of a biomedical research tool to directly evaluate the mutagenicity of mixtures of contaminants in sediment samples. Results of the project provided baseline information on cytotoxicity and mutagenicity of a relatively large number sediment samples collected around LIS. This approach allows whole sediments to be assessed directly without chemical modification. Through direct contact with the sediment, the embryo accumulates only the bioavailable fraction of contaminants associated with the sediments. Thus, this method allows both environmentally and physiologically realistic exposure scenarios. Based on this work, the lead researcher was awarded a major grant from the National Fish and Wildlife Foundation (NFWF) to study the combined effects of endocrine mimics and hypoxia on aquatic organisms using fish embryos to meet the objectives of the Dissolve Oxygen Benefit Fund. The aim of the NFWF project is to use molecular tools to develop a relatively rapid and inexpensive assay to discern the separate and combined effects of hypoxia and endocrine mimics in urban estuarine systems. New methods and rapid assays will lead to better management practices to mitigate effects of sewage loadings. *[(wq wq wq)]*

265 NEW YORK: Sea Grant researchers adapt a cutting-edge biomedical technique to test for the mutagenic potential of coastal sediments

R/CTP-30 New Approaches for Assessing Mutagenic Risk of Contaminants in the Long Island Sound Environment. Sediments in urban coastal waterways may harbor persistent contaminants that pose a threat to both ecosystem and human health. Using a strain of fish embryos carrying a specific gene developed for biomedical research, researchers tested for the mutagenicity of a large number of sediment samples collected around Long Island Sound. IMPACT: Based on this work, a researcher applied the approach to evaluate the mutagenic potential of sediments from the Rhone River in Germany. This work brought the researchers a major grant from the National Fish and Wildlife Foundation to study the combined effects of endocrine mimics and hypoxia and to develop a relatively rapid and inexpensive assay to study effects of hypoxia and endocrine mimics in urban estuaries. This new method will lead to BMPs to mitigate effects of sewage loadings. *[(wq wq wq)]*

1398 NEW YORK: A scientific model of the Great Lakes ecosystem created by Sea Grant researchers is adapted to benefit the local economy.

Sea Grant researchers have examined the primary forces that are driving the flow of energy and materials in Great Lakes ecosystems downward from the water column into the lake bottom sediments. IMPACT: This original “benthification” model provides a management tool to researchers as well as municipalities; a model of the interaction between zebra mussels and reduced phosphorus loading helped the Lake Ontario community of Sodus Bay manage nuisance levels of submerged plants that threatened to overtake the popular waterway and thus prevent a negative impact on the local tourism-based economy. *[R/CE-20 (mod inv)]*

126 NORTH CAROLINA:

A Sea Grant sediment-sampling protocol for fecal indicator bacteria has identified areas of contamination in local waters used by the public. The sediment sampling approach improves upon conventional water sampling because the indicators last longer in sediments than the water-column signals are available. The researchers provided results to the N.C. Environmental Management Commission, which reviewed the strong influence of stormwater runoff on sediment contamination by fecal indicator bacteria. The research results -- reflected in new, stronger storm water regulations – generated strong reaction and media coverage, thus increasing public awareness of the problems. (NCSG: Effects of Sediment Phosphorus Concentration on Fecal Pathogen Indicators in Estuarine Sediments; R/MER-50) *[(wq wq wq)]*

233 NORTH CAROLINA: Tools to Identify Nitrogen Role in Estuaries

Two products are expected from North Carolina Sea Grant research regarding nitrogen in the estuaries. First, The N removal maps for the CFRE and NRE will indicate the presence of N removal hot spots in the estuaries. Second, by optimizing Q-PCR protocols of hzoAB genes, a lower cost and fast screening tool will be designed to predict the contribution of anammox in N capacities in various aquatic ecosystems. The researchers also expect to complete/refine N removal capabilities of the two estuaries based on

anammox and denitrification. This knowledge will permit better estimation of ecosystem N residence time hence providing estuary-specific timescales for water quality improvements following N loading reductions. Additional end-users include city and/or town planners located along these estuaries. Identification of N removal hot-spots can be considered when determining locations and sizes of future wastewater inputs. *[R/MER-57 (mon mod eq ebm)]*

262 NORTH CAROLINA:

North Carolina Sea Grant researchers determined the relative ecological impacts of different types of erosion-control structure types -- results shared with the N.C. Division of Coastal Management (DCM) and N.C. Coastal Resources Commission, which are expected to set regulations for such structures. The Sea Grant researcher and staff erosion control specialist have served on a state workgroup to develop recommendations on erosion-control structures. The research results also were part of a conference hosted by DCM, N.C. Division of Marine Fisheries and NOAA's Beaufort Lab to explore the topic with managers, scientists, elected officials and citizens. (NCSG: Effects of Erosion Control Structures on Adjacent Benthic and Nektonic Communities, R/MER-48) *[(ebm mon)]*

1451 NORTH CAROLINA: Ozone Treatments of Ballast Water

Based on Sea Grant results, a follow-on ballast water research was conducted on a second Alskan Tanker Ship, the S/T Prince William Sound, which was fitted with a single point injection system for ozone treatment of 10,000 gallons per minute. This system will significantly reduce the cost of the treatment and should result in cost effective ballast water treatment. The involvement of Sea Grant has allowed the research team to actively participate with a number of industrial partners to advance this treatment to full scale on the S/T Prince William Sound. These partners are British Petroleum, Alaskan Tanker Corporation, NETSCO, Inc. and Nutech-O3. *[R/NIS-5 (inv)]*

254 OHIO: Sea Grant helps prevent the spread of aquatic invasive species

Ohio Sea Grant, working through the Great Lakes Sea Grant Network, conducted AIS-HACCP workshops to train live fish handlers and aquatic equipment operators in techniques to avoid spreading aquatic invasive species through their operations. Impact: At least 225 handlers and operators received AIS-HACCP certification in eight workshops held in Ohio, Michigan, Indiana, New York, Florida and Ontario. State and provincial fisheries regulators have acknowledged the usefulness of AIS-HACCP in that no further fish handling restrictions based upon AIS have been issued. *[A/EP-1 (inv train)]*

271 OHIO: Sea Grant assists ODNR with Rapid Response Plan

At the request of the Great Lakes Commission and the Ohio Department of Natural Resources (ODNR), Ohio Sea Grant conducted a Rapid Response Plan (RRP) workshop to identify and prioritize RRP ideas. Over three dozen citizens, non-governmental organizations, educators, stakeholders and others

generated RRP ideas and then prioritized the RRP ideas. The workshop helped the ODNR in the development of a RRP for AIS in Ohio. *[(inv)]*

492 OHIO: Sea Grant helps Lake Erie marinas recycle and save money

A boat shrink-wrap recycling program was initiated by Ohio Sea Grant's Clean Marinas Program in 2006, with over 50 tons recycled from 60 marinas. In 2007, 101 marinas participated, with over 100 tons of shrink-wrap recycled from 101 participating Ohio Lake Erie coastal marinas. A post-program survey revealed marinas saved an average of $700 each by recycling instead of paying additional landfill and waste hauling fees. *[(wq)]*

493 OHIO: Sea Grant reduces marine pollution

The Ohio Clean Marinas Program (OCMP) certifies marinas as an 'Ohio Clean Marina' provided they comply with all legal requirements set forth by state regulatory agencies, in addition to numerous Best Management Practices identified in the OCMP manual. During the past three years, owner and managers from 85 marinas have attended OCMP certification workshops. Currently, 39 Lake Erie coastal marinas have earned OCMP certification, with another 20 marinas currently pledged to become Clean Marinas. *[(wq)]*

549 OHIO: Sea Grant reduces marine pollution

Hazardous chemicals and polluted stormwater runoff are common to many marina operations but Ohio Sea Grant's Clean Marinas Program certifies marinas that have implemented EPA approved pollution control practices. Impact: In the last year, managers from 17 marinas have attended Ohio Clean Marinas workshops, 4 marinas have been awarded certification, and another 7 marinas have taken the pledge to become Clean Marinas. *[(wq)]*

117 OREGON: Contamination Source Identified by Sea Grant Efforts

Spurred by high beach closures due to contamination, Oregon Sea Grant's Curry County Extension Agent Frank Burris, teamed with state and federal researchers and coast citizens to document the timing and extent of bacterial contamination. His vigilant and frequent sampling reduced the number of beach closure days by 43%. And, more importantly the more than 300 water samples taken over the past three years along five creeks and the ocean identifies the source is terrestrial, not marine. Not only is the bacteria coming from upstream, the 24-hour tests showed that the level of harmful bacteria increased at night. A newly discovered finding as DEQ always takes water samples during the day. Sleuthing the upstream source (sources) is underway Speculation at this point leans towards a combination of septic tank system failures and high water runoff (with domestic animal feces) from city neighborhoods. The many hours spent in early 2007 in waist high surf taking middle-of-the-night water samples is paying off. http://www.currypilot.com/ne/results.cfm?story_no=14484

http://oregonprogress.oregonstate.edu/mediaindex.php#slideshow scroll down to 'Tracking Beach Contamination.' Then click on 'slide show' to view. *[A/ESG-7 (wq wq wq)]*

214 OREGON: The Gravel Extraction Industry and Fish Habitat Interests Work Together

In-stream aggregate mining (the removal of material from a streambed) has direct impacts on the channel's physical boundaries, on the ability of the stream to transport and process sediment, and on numerous related aquatic habitat characteristics. Effects can include changes in channel geometry, reduced streambed elevation, changes in substrate composition, loss of in-stream roughness elements, decreased average stream depths, and changes in water velocity patterns. Unfortunately, there is a lack of consensus among various regulatory agencies, mining operators, and other stakeholders as to what constitutes best management practices for in-stream aggregate mining operations. Several stakeholders asked Oregon Sea Grant (OSG) to review this situation and offer guidance. In response, OSG and several partners brought together nearly 90 researchers, scientists, engineers, hydrologists, agency representatives, gravel operation managers, and appropriate stakeholders to discuss gravel-mining impacts on fisheries and water quality, existing regulations, and operations. The roundtable, workshop-style format allowed the attendees to work together and propose alternative operation methods that minimize ecosystem impacts, identify potential research questions and projects, and offer alternative appropriate regulations for the industry. As a result, follow-up meetings and focus groups continued, with a decision made to center efforts on the Chetco River and continue working together to finalize the research plan and next steps. Since then, the group has progressed, meeting with USGS representatives and planning the next step of completing a pilot project designed to provide an example of a mechanism (template) to use for related industry operations in other watershed systems. *[(ebm unk)]*

255 OREGON: Oregon Sea Grant Pilot Project Brings About AIS Monitoring Protocols

A lack of AIS protocols posed both a serious potential problem for spreading AIS into Oregon's healthy watersheds. For Sea Grant it was an opportunity. OSG developed trainings, guides and monitoring and reporting protocols. The US Forest Service and the USDI BLM Aquatic and Riparian Effectiveness Monitoring Program (AREMP) from California to Washington tested our protocols during the summer of 2007. The evaluation and success of the program has resulted in a formal adoption of an expanded AIS monitoring protocol into all of the agencies aquatic monitoring programs from British Columbia border to Point Reys, California. This is seen as model by the multi-agency PNAMP, (Pacific NW Aquatic Monitoring Program) responsible for coordinating aquatic health monitoring for natural resource agencies in the NW. These monitoring efforts will not just help in early detection, but also help in preventing further movement and allow for effective control and prevention programs to minimize the impacts from aquatic invasive species. *[A/ESG-7 (inv train mon)]*

256 OREGON: Oregon Sea Grant A Major Player in Spreading the Word on Aquatic Invasives

When Oregon Sea Grant embarked on the journey to protect Oregon's waterways from nasty aquatic invasives we had no idea of the momentum and interest that would build as awareness of the issue and the battle cry of partners took hold across the state and nation. From the schoolteachers who 'humanely

released'□ classroom specimens like the rusty crayfish into local waters, to the classroom supply houses that shipped aquatic invasive critters to teachers nationwide; from the recreational stream fisherman to the US Forest Service fire fighter who had no clue their boots could spread the New Zealand Mudsnail in Oregon's waterways-- a change is happening. A crusade to educate and take action is spreading nearly as fast as the invasives! Partners are numerous -- government and non-government agencies, institutions, watershed councils, teachers, pet stores, recreationists, environmentalists, college to grade school students and general citizens. We have had to reprint thousands of Oregon Sea Grant-created posters, brochures, and publications due to the demand. Requests for the 'do not release'□ brochure and poster for classroom AIS are used not only in Oregon, Washington and California but Arizona, Iowa, Louisiana, Illinois and Florida. The New Zealand Mudsnail Prevention publication has been reprinted and distributed in Scotland, Canada and New Zealand. Early impacts are occurring. Classroom students recognized that rusty crayfish were being used in their classrooms; teachers no longer release the animals but are using the situation as learning opportunities to research the species and learn about the impacts of invasives; and new classroom curriculum is being developed on invasives. The mudsnail prevention guides used by fly-fishing clubs in public events resulted in early detection in the Tillamook Bay area allowing agencies to post signs and prevention information to minimize further spread. The US Forest Service reports they developed region-wide protocols for their fire personnel using the prevention guide. And, Oregon's Invasive Species Council reported that 'None of the organisms on the 100 worst list became established in Oregon in 2007.'□ A result that Oregon Sea Grant and its partners hope to repeat in 2008's report. *[A/ESG-7 (inv train edu edu)]*

234 PENNSYLVANIA: Preventing Boater Pollution

Started a collaborative boat shrink-wrap recycling program in the Erie area in an effort to keep shrink-wrap out of waterways and landfills. The seven participating marinas collected 25,000 pounds of boat shrink-wrap. The shrink-wrap coming off of a boat can weight anywhere from 35-50 pounds depending on the boat size. Mondo Polymer Technologies, Inc. from Reno, Ohio recycled the shrink-wrap into 3,500 environmentally safe guardrail blocks for highway guardrail systems across the nation. *[(wq)]*

235 PENNSYLVANIA: Erosion and Sedimentation Control

Engineers installed BMPs to control stormwater runoff and associated erosion on the Penn State Behrend campus. These upgrades will prevent an estimated 78 tons of sediment from entering Fourmile Creek each year. *[(wq wq)]*

236 PENNSYLVANIA: Raising Awareness of Pharmaceutical Waste in Pennsylvania's Waterways

Collaborated with Lake Erie-Allegheny Earth Force, Erie Times News in Education, LECOM School of Pharmacy, and the City of Erie to hold a pharmaceutical collection event and provide education and outreach efforts to the residents of Erie on the safe and proper disposal of unwanted or expired pharmaceuticals. The collection event brought in 87 participants and collected 600 pounds of unwanted medications and personal care products. The media campaign reached thousands of Erie citizens via newspaper articles, newscasts, surveys, posters and postcards, and presentations. *[(wq wq wq)]*

481 PENNSYLVANIA: Helping Landowners Preserve Environmentally Sensitive Land

PASG assisted the Lake Erie Region Conservancy and municipalities to secure funding to carry out simple acquisition and conservation easements to preserve open space and protect environmentally sensitive areas in the Pennsylvania Lake Erie drainage basin. Highlights include efforts to: 1) acquire 85.1 acres connecting the Seaway Trail with Game Land 314 in Springfield Township; 2) acquire a 46.6-acre access easement along Elk Creek in Fairview Township; and 3) acquire a conservation easement on 16.3 acres along the Lake Erie bluffs in Harborcreek Township. *[(ebm)]*

1486 PENNSYLVANIA: Preventing Boater Pollution

Distributed approximately 3,500 bilge socks and associated outreach materials to boaters across Pennsylvania as a pollution prevention measure. Each bilge sock can absorb 1.5 quarts of oil; the project has the potential to prevent 5,250 quarts of oil from entering Pennsylvania's waterways. *[A/ (wq edu)]*

319 SOUTH CAROLINA: Instrumentation deployed to understand sediment flow patterns as they relate to beach renourishment.

Preliminary data analysis has shown that sediment suspension and transport occurs frequently on the hard bottom reefs on the shore face and inner-self region during small to moderate meteorological events (winds greater than approximately 10 m/s). In addition, sediment thickness on the hard bottom reefs has been shown to be variable on time scales such as days to months. All instrumentation was deployed July 1st, 2009, and has been collecting continuous times series data over four 6-8 week deployments. The instrumentation is currently deployed at the site and continuous deployments will continue throughout the year 2009. Additional data analysis efforts are being undertaken to address (1) constraining the environmental forcing resulting in along-shelf vs. across-shelf transport of sediment (2) determining the frequency and magnitude of these transport components and (3) relating the temporal variability of sediment transport measured in between geophysical surveys to the observed spatial changes. *[R/CH-1 (mon wq mon)]*

237 TEXAS: Texas Sea Grant supports private partnerships in and sponsorships of environmental protection programs (2008)

After completing its transition to an industry-managed model as prompted by Texas Sea Grant's marine business specialist, the Clean Texas Marina Program is much less dependent on ongoing federal and state funding and is expected to have less difficulty attracting marina participation now that a regulatory agency is not a principal in the program, thus increasing the number of marinas and boaters in Texas who adhere to best environmental practices. During the reporting period, five additional marinas became certified under the program, three marinas were recertified and three new marinas pledged to participate; more than half of these were after the change to the industry-managed model. *[A/F-1 (train wq)]*

238 TEXAS: Texas Sea Grant promotes public participation in environmental protection programs (2008)

As an adjunct to the Clean Texas Marina Program and also administered by the Texas Sea Grant marine business specialist, the Clean Texas Boater Program continued to promote environmentally sound practices to individual boaters in Texas. The program solicited an additional 1,000 recreational boaters pledging to support clean water in Texas during the reporting period, bringing the total membership up to 3,500. The program has been adopted by several clean marina programs in the country, including Maryland, Virginia and Mississippi/Alabama potentially expanding knowledge of and participation in clean boating practicing exponentially. *[A/F-1 (train wq)]*

240 TEXAS: Texas Sea Grant leads effort to remove monofilament line from the environment (2008)

Volunteers in the ongoing Monofilament Recovery and Recycling program continued to collect monofilament fishing line from recycling bins and send it in to be recycled. The program strives to increase public awareness of the impact to wildlife and property by improper disposal of monofilament fishing line into the environment. A total of 118 pounds of monofilament line was collected and sent to be recycled during the reporting period. *[A/F-1 (wq train)]*

244 TEXAS: Work and monitoring was continued on Brays Bayou stormwater treatment wetland project (2008)

Wetland Restoration Team efforts continued on the award-winning Brays Bayou stormwater treatment wetland project. This wetland project has received much local attention after winning a Gulf Guardian Award for partnership in December 2006 and being featured on local news programs. The Wetland Restoration Team continued to collect water quality monitoring data (temperature, water clarity, conductivity, dissolved oxygen levels, E. coli presence and quantity) to evaluate the success of the wetland. Preliminary data suggest near complete treatment of stormwater runoff for bacteria, the contaminant of most interest in the Houston area. Funding was received to improve the monitoring effort. The project involved 12 different partners, of which the Texas Coastal Watershed Program (TCWP) was the coordinator for the partnership. This project brought new ideas and perceptions of stormwater wetland systems to the region. *[A/F-12 (wq)]*

247 TEXAS: Texas Sea Grant promotes public participation in environmental protection programs (2009)

As an adjunct to the Clean Texas Marina Program and also administered by the Texas Sea Grant marine business specialist, the Clean Texas Boater Program continued to promote environmentally sound practices to individual boaters in Texas. The program solicited an additional 1,000 recreational boaters pledging to support clean water in Texas during the reporting period, bringing the total membership up to 3,500. The program has been adopted by several other clean marina programs in the country, including Maryland, Virginia and Mississippi/Alabama. *[A/F-1 (train wq)]*

249 TEXAS: Texas Sea Grant removes monofilament line from the environment (2009)

Volunteers in the ongoing Monofilament Recovery and Recycling program continued to collect monofilament fishing line from recycling bins and send it in to be recycled. The program strives to increase public awareness of the impact to wildlife and property by improper disposal of monofilament fishing line into the environment. A total of 141.9 pounds of monofilament line was collected and sent to be recycled during the reporting period '" an increase of 20 percent over 2007. Estimating line strength at 12 pound test (common for coastal Texas), this 141.9 pounds corresponds to a distance between 225.7 and 378.9 miles (roughly the distance between Houston and New Orleans). This brings the total pounds reported collected to 440.9 pounds since 2004 (the first year of records). *[A/F-1 (train wq)]*

1589 WASHINGTON: Sea Grant Develops Tools to Determine Sources of Shellfish Contamination

Shellfish growing areas in Puget Sound are classified as suitable for harvest based on sanitary surveys and fecal coliform monitoring. Sea Grant researchers developed a novel F+ RNA coliphage genotyping assay to differentiate between human and animal sources of fecal contamination. Impact: Newly developed fecal coliform indicators assisted the WA Department of Ecology, the Squaxin Tribe, and local shellfish growers to identify sources of shellfish contamination and develop appropriate management strategies for shellfish growing areas. *[R/A-84 (Prog Dev) (mon wq)]*

1592 WASHINGTON: Sea Grant doubles Clean Marina participation

There currently are more than 200 marinas in the state that would be eligible to participate in Clean Marina Washington. The long-term goal is to enlist all of them in this incentive-based certification program in which marinas assess their operations and implement environmental safeguards. Participants agree to use best management practices including approved fueling procedures, stormwater run-off treatment, and toxic controls to protect marine water quality. Partnering with Puget Soundkeepers, state agencies and local boating organizations, Sea Grant provides marina certification inspections throughout Puget Sound and coastal Washington. Impact: In 2007, 18 new certifications were approved for public and private marinas, doubling participation in Clean Marina Washington. *[A/FP-7 (wq)]*

1607 WASHINGTON: Sea Grant Offers Homeowners Simple Techniques to Reduce Nutrient Loading into Hood Canal

Hood Canal is experiencing low dissolved oxygen levels partly due to excess nitrogen in the ecosystem, resulting in fish kills and other changes to the local ecology. Sea Grant is training homeowners to install simple kitchen sink screens that trap food waste and reduce introduction of nitrogen into septic systems that drain into Hood Canal. Impact: Over 2,000 homeowners now use these devices, preventing an estimated 1.5 tons of nitrogen from being introduced into Hood Canal. *[A/FP-7 (train wq)]*

1618 WASHINGTON: Sea Grant research develops effective biological controls for an invasive intertidal grass

Biological controls that use natural enemies have long been used as an economical and sustainable means of combating invasive weeds. However, the approach has had limited application in intertidal environments. Sea Grant research has developed and optimized a biological control program for Spartina alterniflora and S. anglica, invasive cordgrasses introduced into Washington's estuaries from the Atlantic Coast. Research examined the most effective strain of the biocontrol agent Prokelisia marginata, a planthopper specialized to Spartina. Impact: Biocontrol was found to be a viable and economical but slower-acting alternative to herbicide control. Biocontrol insect populations were able to establish, and, through time, the populations grew to produce visible impacts. Where biocontrol agents reached moderate to high densities, Spartina seed set was reduced by as much as 90 percent, and one seven-acre site had visible browning of above ground plant tissue due to the insects. *[R/ES-63 (inv)]*

1636 WASHINGTON: Sea Grant Research Tests Biological Controls for Invasive Intertidal Grass (Spartina)

Biological controls have long been used as an economical and sustainable means of combating invasive weeds. This approach recently was applied in an intertidal environment to control Spartina, an invasive cordgrass introduced to Pacific estuaries from the Atlantic coast. Sea Grant researchers developed and optimized use of Prokelisia marginata, a planthopper, as a biological control for Spartina. In moderate to high densities, the biocontrol agent reduces Spartina seed set by as much as 90 percent, with visible browning of aboveground plant tissue. Impact: Biocontrol was found to be a viable and economical, though slower-acting alternative to herbicide control. While managers may continue to choose herbicides, an optimized and integrated biocontrol program will be available to treat Spartina invasions. The program may also be applied internationally, especially where Spartina infestations are more expansive and resources may not be available for herbicide control. *[R/ES-63 (inv)]*

1646 WASHINGTON: Sea Grant works to expand Clean Marina Program

A founding member of Washington's Clean Marina Partnership, Sea Grant provides marina certification inspections throughout the Puget Sound and coastal regions. Participating public and private marinas employ best management practices for fueling procedures, stormwater treatment, toxic control and other activities, contributing to the cleanup of local water bodies. Impact: More than 40 Washington marinas have been certified since the inception of the program, with 18 new Clean Marina certifications approved in 2008. *[A/FP-7 (wq)]*

220 WISCONSIN: Sea Grant researcher develops molecular tools for use in wild rice conservation and restoration

Researchers developed an inexpensive and rapid genetic test to identify genetic differences and diversity in wild rice. The molecular markers are being used to develop procedures for protecting wild rice in habitats where it is declining or has been reintroduced. The markers are also being used to

provide varietal protection to all publically owned varieties of cultivated wild rice, worth $30 million annually. *[R/BT-23 (unk)]*

250 WISCONSIN: Sea Grant Helps Entrepeneurs Address Dreissenid Mussel Nuisance on Beaches

Wisconsin Sea Grant's water quality specialist was contacted by two individuals who invented a portable machine for vacuuming up mussel shells from beaches and grinding them into sand. She helped organize a meeting (June 6, 2008) with state Department of Natural Resources staff to address potential environmental concerns and state permit requirements. As a result of the meeting, WDNR encouraged the Beachmakers Co. to conduct field tests on state-operated beaches during summer 2008 and is considering drafting a general permit to allow transformation of shells to sand and redeposition on beaches without lengthy and expensive individual permits ($500 and several months time). *[A/AS-1 (wq inv)]*

257 WISCONSIN: Better Control of Invasive Common Reed Grass

Sea Grant helped organize and host a workshop in February 2008 to improve and coordinate Phragmites management in Northeast Wisconsin. Over 100 agency staff, land managers and local volunteers attended and shared information about best available control techniques and state permit requirements. The workshop provided consistent guidance to agencies and the public on effective control methods and served to coordinate the control efforts of multiple agencies and volunteer groups. A website was established to share workshop results, including maps of past and future control sites. Participants recommended that a statewide strategy for Phragmites management is needed. Harris subsequently prepared a project proposal for the WDNR and Lake Michigan Stakeholders to develop and implement the strategy. Workshop evaluations were extremely positive and nearly all participants advised that the workshop be repeated every other year. *[A/AS-1 (inv)]*

330 WISCONSIN: Sea Grant researchers identify tissue-specific gene markers

We have identified tissue-specific gene markers associated not only with exposure to TCDD, but also correlated with toxic outcomes. These are being used to design simple assays measuring the level of dioxin-induced toxicity in native fish *[R/BT-22 (fish)]*

488 WISCONSIN: Sea Grant partners with Miller Brewing Company to improve Bradford Beach

Our lab, together with Miller Brewing Company and the Milwaukee Metropolitan Sewage District, collaborated with Milwaukee County Parks in their application for a Blue Wave Award, which is given to beaches meeting certain quality criteria. Our research contributes to both monitoring and remediation aspects of this goal. Miller Brewing Company is investing $500,000 into improving Bradford beach, $100,000 of which is directed to the GLWI to fund additional monitoring of the sand, buoys, a web cam, and signage. *[R/UC-2 (wq mon)]*